



JP2000-64198

[Claim 1] An anti-counterfeit paper forming windows (W) and tunnels (l) continuously in flow direction of surface of paper, wherein the length of windows and/or length of tunnels in paper flow direction is different, and threads (T) having different optical characteristic from optical characteristic of tunnels are exposed in the windows.

[0018] Manufacturing example of hologram threads (see Fig. 7)

On one side of polyester film a of 12  $\mu\text{m}$  in thickness, a transparent thermoplastic resin is applied by about 2  $\mu\text{m}$ , and a thermoplastic resin coat layer e is formed, and a hologram pattern f is thermally embossed thereon. Further on this hologram pattern f, metal aluminum is evaporated by about 400 to 500 angstroms, and an aluminum evaporation layer b is formed, and a thermosensitive adhesive is applied on the aluminum evaporation layer b, and a thermosensitive adhesive coat layer d is formed. In this configuration, the side of polyester film a is exposed to windows, and the hologram pattern f can be seen through the polyester film a, and this portion is extremely large in reflectivity of light as compared with the tunnels of the paper. Therefore, in this configuration, when yellow, blue or red dye is added to the thermoplastic resin coat layer e, as seen from the thread surface side, a hologram pattern f of gold color, blue silver color, or red silver color can be seen through the polyester film a.

[0030] Making of paper

In a circular mesh cylinder of a first tank of two-tank circular mesh paper making machine, an upper mesh without processing was installed,

and an upper mesh provided with the die was installed in a circular mesh cylinder of a second tank. Paper was manufactured by overlaying two layers of paper material at paper making speed of 50 m/sec so that the second layer of paper (outermost layer) formed in the second tank might be overlaid on the first layer of paper formed in the first tank. In this process, between the first layer (converted to dry weight of  $60 \text{ g/m}^2$ ) and second layer ( $40 \text{ g/m}^2$ ), the threads manufactured in the above operation were inserted at a position corresponding to the center of the die by a method proposed by the present applicant in Japanese Patent Publication No. 5-40080, so that the film surface side might be exposed to the windows. Consequently, by dewatering the damp paper by conventional method, and drying by cylinder drier, an anti-counterfeit paper of the invention consisting of two layers of paper was manufactured.

# PATENT ABSTRACTS OF JAPAN

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D21H 27/34

(21)Application number : 10-226658

(71)Applicant : TOKUSHU PAPER MFG CO LTD

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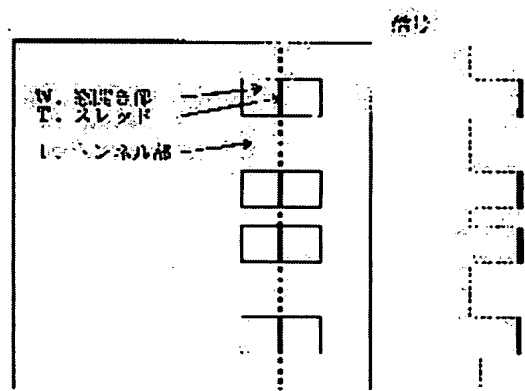
(72)Inventor : MURAKAMI TORU

(54) FRAUDPROOF PAPER, FRAUDPROOF PRINTED MATTER AND DETECTION OF FRAUDPROOFING MEANS

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a means for automatically detecting a fraudproofing means by using a thread-inserted windowed paper having a thread exposed in windows opened on the surface of a paper leaving spaces between the windows.

**SOLUTION:** The objective fraudproof paper is provided with windows W and tunnels 1 continuously formed on the surface of a paper in the flowing direction of the paper. The lengths of the windows and/or tunnels are different in the flowing direction of the paper and a thread T having an optical property different from that of the tunnel is exposed in the windows. A prescribed print is applied to the surface of the fraudproof paper to obtain a fraudproof printed matter. The paper can be identified by automatically detecting the length of the thread exposed in the fraudproof paper or in the window of the fraudproof paper and the length of the tunnel by an optical means.



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CLAIMS

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[Claim(s)]

[Claim 1] The forged prevention form characterized by for the thread (T) which has an optical property which the die length of this aperture aperture section to the flow direction of a form differs from the die length of the tunnel section, and is different from the optical property of the tunnel section in this aperture aperture section in the forged prevention form with which the aperture aperture section (W) and the tunnel section (1) were continuously formed in the flow direction of the front face of a form to be exposed.

[Claim 2] Forged prevention printed matter characterized by performing predetermined printing to the front face of said forged prevention form.

[Claim 3] The detection approach of the forged prevention means characterized by specifying a form by detecting automatically the die length of the thread exposed to the aperture aperture section of said forged prevention form or forged prevention printed matter, and the die length of the tunnel section with optical means.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the detection approach of a forged prevention form, forged prevention printed matter, and a forged prevention means. In the forged prevention form which exposed the thread in the aperture aperture section intermittently prepared in the flow direction on the front face of a form in more detail The forged prevention printed matter which performed predetermined printing to the forged prevention form to which the die length of the aperture aperture section and the tunnel section was changed, and this forged prevention form, And it is related with the approach of detecting the forged prevention means adopted as this forged prevention form or forged prevention printed matter by detecting automatically the die length of the thread exposed to the aperture aperture section of the front face of this forged prevention form or forged prevention printed matter, and the tunnel section with optical means.

[0002]

[Description of the Prior Art] Various kinds of forged preventive measures are given so that a bill, a gift certificate, etc. cannot be altered unjustly and cannot be forged. One of the ideas of forged preventive measures is manufacturing a form using an advanced manufacturing technology so that it cannot manufacture easily. As the example, there is a forged prevention form called "the paper containing an aperture aperture thread", and it is mostly used with a bill, a gift certificate, etc. of each country. Drawing 1 shows the example. Drawing 1 is the conceptual diagram showing an example of the conventionally well-known paper containing an aperture aperture thread which the aperture aperture section W and the tunnel section 1 were intermittently formed in the flow direction of a form, and Thread T has exposed to these apertures aperture section.

[0003] Various the manufacture approaches of said paper containing an aperture aperture thread are proposed. For example, the belt device in which it has the slot which let the thread pass is buried at the tip of heights of the guide which has irregularity in the pulp suspension on the wire of a Fortlinear paper machine, and the method of manufacturing the paper containing an aperture aperture thread is proposed by JP,05-085680,B.

[0004] Moreover, the method of making JP,06-272200,A build in a compressed-air nozzle in the rotating drum on a Fortlinear-paper-machine wire, blowing away intermittently the slurry on the thread beforehand inserted in the wet paper web to it by the compressed air, and exposing a thread to it is proposed.

[0005] Moreover, the method of using the network into which it processed concave convex for the upper network of a cylinder machine, inserting in U.S. Pat. No. 4462866, contacting a thread to the concave heights on the front face of a network, and exposing a thread into an aperture aperture part is proposed.

[0006] Moreover, in Japanese Patent Application No. No. 135244 [ eight to ], these people used the multi-tub type cylinder machine, and proposed the approach of supplying a thread for the paper of the outermost layer in which the aperture aperture section was formed, and the plain paper which is not formed to an aperture aperture part in the \*\*\*\*\* case.

[0007]

[Problem(s) to be Solved by the Invention] Each "paper containing an aperture aperture thread" of these former had judged the truth or falsehood of a form by observing the thread intermittently

exposed to the form front face at regular intervals by viewing. When inadequate [ temporarily ] and forged a gift certificate and a check have been used, and a forged prevention means is detectable with the total machine which finally totals the amount of money etc., forgery can be automatically discovered at this time and the forged prevention effectiveness will increase more. Let it be a technical problem to have made this invention in such a viewpoint and to acquire the detection approach of a new forged prevention form, forged prevention printed matter, and a forged prevention means.

[0008]

[Means for Solving the Problem] In the forged prevention form with which the aperture aperture section W and the tunnel section 1 were continuously formed in the flow direction of the front face of a form, the die length of this aperture aperture section to the flow direction of a form differs from the die length of the tunnel section, and this invention is a forged prevention form characterized by the thread T which has the optical property that the optical properties of the tunnel section differ, in this aperture aperture section being exposed.

[0009] Moreover, this invention is forged prevention printed matter characterized by performing predetermined printing to the front face of said forged prevention form.

[0010] Moreover, this invention is the detection approach of the forged prevention means characterized by specifying a form by detecting automatically the die length of the thread exposed to the aperture aperture section of said forged prevention form or forged prevention printed matter, and the die length of the tunnel section with optical means.

[0011]

[Embodiment of the Invention] This invention is explained to a detail below. Drawing 2 is the conceptual diagram showing an example of the forged prevention form of this invention, and the aperture aperture section W and the tunnel section 1 are continuously formed in the flow direction of the front face of a form. In this example, the thread T which has an optical property which each die length of the aperture aperture section to the flow direction of a form is the same, and the die length of the tunnel section differs, and is different from the optical property of the tunnel section in this aperture aperture section is exposed.

[0012] Drawing 3 is the conceptual diagram showing another example of the forged prevention form of this invention, and the aperture aperture section W and the tunnel section 1 are continuously formed in the flow direction of the front face of a form. In this example, the die length of the aperture aperture section to the flow direction of a form differed, the die length of the tunnel section is the same, and the thread T which has an optical property which is different from the optical property of the tunnel section in this aperture aperture section is exposed.

[0013] Drawing 4 is the conceptual diagram showing another example of the forged prevention form of this invention, and the aperture aperture section W and the tunnel section 1 are continuously formed in the flow direction of the front face of a form. In this example, the thread T which has an optical property which the die length of the aperture aperture section to the flow direction of a form differs from the die length of the tunnel section, and is different from the optical property of the tunnel section in this aperture aperture section is exposed.

[0014] In order to manufacture the forged prevention form of this invention, first Broad-leaved tree bleached kraft pulp (LBKP), Needle-leaved tree bleached kraft pulp (NBKP), a hardwood bleached sulfite pulp (LBSP), wood pulp called mechanical pulp, such as chemical pulp, such as softwood bleached sulfite pulp (NBSP), and ground pulp (GP), a thermomechanical pulp (TMP), -- further Non-wood pulp, such as cotton pulp, hemp, a bagasse, a kenaf, S PARUTO, a paper mulberry, a paper birch, and ganpi, independence, Or two or more kinds are used together, a desiccation paper reinforcing agent, a humid paper reinforcing agent, a sizing compound, a fixing agent, a yield improver, a filtration improvement agent, a defoaming agent, a color, a color pigment, etc. are suitably used together to this, and the pulp of freeness 250 - 550mlC.S.F. is usually prepared.

[0015] In this invention, it is required to use the thread which has a different optical property from the optical property of the tunnel section of a form. In order to realize this, it is good to change the rate of a light reflex of a thread with a tunnel part.

[0016] Hereafter, a concrete example is explained based on a number of points or a drawing. The example of manufacture of a silver thread (refer to drawing 5 )

After carrying out 400-500A vacuum deposition of the metal aluminum to one field of polyester film a with a thickness of 12 micrometers and forming the vacuum-plating-of-aluminium layer b in it, further, on this, coating of about 2 micrometers of the acrylic resin of 2 liquid hardening mold is carried out using a gravure coating machine, and the acrylic resin coating layer c is formed. Coating of about 5 micrometers of the sensible-heat adhesives is carried out to the field of another side of polyester film a, and the sensible-heat adhesives coating layer d is formed. . Subsequently, a slit is continuously carried out to thin width using a micro slitting machine, a thread is manufactured, and it rolls round in a bobbin. The thread of this configuration is \*\*\*\*\* to a form, as an acrylic resin coating side side is exposed to a form in the aperture aperture section at a \*\*\*\*\* case. The sensible-heat adhesives coating layer d serves as a thread rear face, and is firmly pasted up with the cellulose fiber which fuses at the time of desiccation of a form and constitutes a form. If it sees from a thread front-face side, the vacuum-plating-of-aluminium layer b looks silver through the acrylic resin coating layer c, and, as for this part, the reflection factor of light is remarkably large as compared with the tunnel section of a form.

[0017] The example of manufacture of a golden thread (refer to drawing 6 )

In above-mentioned drawing 5 , a yellow color is added in the acrylic resin coating layer c of 2 liquid hardening mold. With this configuration, if it sees from a thread front-face side, the vacuum-plating-of-aluminium layer b looks golden through the acrylic resin coating layer c colored yellow, and, as for this part, the reflection factor of light is remarkably large too as compared with the tunnel section of a form. In addition, the vacuum-plating-of-aluminium layer b comes to be visible to blue silver or red silver, when blue or a red color is added in the acrylic resin coating layer c through the acrylic resin coating layer c, respectively.

[0018] The example of manufacture of a hologram thread (refer to drawing 7 )

After carrying out coating of about 2 micrometers of the transparent thermoplastics to one field of polyester film a with a thickness of 12 micrometers and forming the thermoplastics coating layer e in it, heat embossing of the hologram pattern f is carried out on this. Subsequently, on this hologram pattern f, 400-500A of metal aluminum is vapor-deposited further, the vacuum-plating-of-aluminium layer b is formed, on the vacuum-plating-of-aluminium layer b, coating of the sensible-heat adhesives is carried out, and the sensible-heat adhesives coating layer d is formed. With this configuration, the a-th page side of polyester film is exposed to the aperture aperture section, the hologram pattern f can be checked by looking through polyester film a, and, as for this part, the reflection factor of light is remarkably large as compared with the tunnel section of a form. In this structure, when yellow, blue, or a red color is added in the thermoplastics coating layer e, if it sees from a thread front-face side, the hologram pattern f of golden, blue silver, or red silver can be seen through polyester film a, respectively.

[0019] The example of manufacture of the thread containing a minute alphabetic character (refer to drawing 8 )

After printing h Making it one field of polyester film a with a thickness of 12 micrometers using black ink, using a minute alphabetic character as a flesh-side alphabetic character, after this printing h, vacuum deposition of the metal aluminum is carried out, and the vacuum-plating-of-aluminium layer b is formed. Subsequently, on the vacuum-plating-of-aluminium layer b, coating of the sensible-heat adhesives is carried out further, and the sensible-heat adhesives coating layer d is formed. The thread of this configuration exposes the a-th page side of polyester film in the aperture aperture section. When it expands and observes with a magnifier etc. from a thread front-face side, the printing h of the minute alphabetic character of a forward black alphabetic character is in sight in the silver background of the vacuum-plating-of-aluminium layer b through polyester film a. In addition, without being based on printing processing, a minute alphabetic character may be extracted and may be given by processing (the so-called PASUTA processing). it is \*\*\*\*\* about the thread of this configuration -- as compared with the tunnel section of a form, the reflection factor of light is [ the part of the thread which the object for forged prevention exposes to the aperture aperture section ] remarkably large.

[0020] The example of manufacture of a magnetic thread (refer to drawing 9 )

Coating of about 10 micrometers of the magnetic coatings which use the polyester resin and the ferrous-oxide powder of 2 liquid hardening mold as a principal component is carried out to one field



of polyester film a with a thickness of 12 micrometers using a gravure coating machine, and the magnetic coating coating side g is formed in it. Coating of about 5 micrometers of the sensible-heat adhesives is carried out to the field of another side of polyester film a, and the sensible-heat adhesives coating layer d is formed. If the thread of this configuration is seen from a thread front-face side, the magnetic coating coating layer g is visible to the color (brown and black) of iron oxide powder, and, as for this part, the reflection factor of light is small on the contrary until now as compared with the tunnel section of a form.

[0021] What is necessary is to supply said slurry on the wire of a Fortlinear paper machine, to change the die length of the concave heights of a guide which have irregularity, to bury the belt device in which it has the slot which let the thread pass at the tip of heights, and just to expose a thread in the aperture aperture section of a form, in manufacturing by the approach of JP,05-085680,B which described above the forged prevention form of this invention.

[0022] Moreover, what is necessary is just to expose a thread in the aperture aperture section of a form by changing the time amount to blow away, in case the slurry on the thread which was made to build in a compressed-air nozzle in the rotating drum on a Fortlinear-paper-machine wire, and was beforehand inserted in the wet paper web is intermittently blown away by the compressed air, when manufacturing by the above mentioned approach of JP,06-272200,A.

[0023] Moreover, what is necessary is to use the network to which the die length which processed concave convex was changed for the upper network of a cylinder machine, to insert, contacting a thread to the concave heights on the front face of a network, and just to expose a thread into an aperture aperture part, in manufacturing by the approach of U.S. Pat. No. 4462866.

[0024] Moreover, what is necessary is to use a multi-tub type cylinder machine and just to make the aperture aperture part which changed die length to the paper of the outermost layer carry out thread exposure, when these people manufacture by the approach of Japanese Patent Application No. No. 135244 [ eight to ] proposed previously.

[0025] Under the present circumstances, as these people proposed by Japanese Patent Application No. No. 135244 [ eight to ], it can also perform suitably allotting the water mark which becomes the aperture aperture section from an alphabetic character or an image.

[0026] It cannot be overemphasized that not only the approach described above in this invention when the paper containing an aperture aperture thread was manufactured but all the approaches conventionally proposed by manufacture of the paper containing an aperture aperture thread are employable.

[0027]

[Example] An example explains the actual example of manufacture of the forged prevention form of this invention below.

After vapor-depositing 400A of metal aluminum to one field of polyester film with a manufacture thickness [ of example 1 thread ] of 12 micrometers and forming a vacuum-plating-of-aluminium layer in it, they are polyester system sensible-heat adhesives (a trade name "Byron", Toyobo Co., Ltd. manufacture) on this further 5g/m<sup>2</sup> Coating (desiccation conversion) was carried out and the sensible-heat adhesives coating layer was formed. Subsequently, the slit was carried out to a width of 1.5mm using the micro slitting machine, and the thread was manufactured.

[0028] Beating of the preparation NBKP20 weight section of pulp and the LBKP80 weight section was carried out to freeness 350mlC.S.F., and optimum dose \*\*\*\* pulp was prepared for the clay 10 weight section, the paper reinforcing agent (product made from trade name "police TRON 191" Arakawa Chemical industry) 0.3 weight section, the sizing compound (product made from trade name "size Pineapple E" Arakawa Chemical industry) 1.0 weight section, and a sulfuric-acid band to this.

[0029] It stuck continuously so that 5mm spacing and 15mm spacing might repeat many molds which become the upper network (width of face of 1300mm) of the cylinder-mould cylinder of the manufacture 2 tub type cylinder machine of a paper-making network from 10mm of shorter sides, 15mm of long sides, and a resin plate with a thickness of 0.3mm to the flow direction of paper using adhesives. This train was attached crosswise [ of an upper network ] 6 train picking at equal intervals.

[0030] The cylinder-mould cylinder of eye one tub of the paper-milling 2 tub type cylinder machine

of a form was equipped with the upper network which does not manipulate at all, and the cylinder-mould cylinder of eye two tubs was equipped with the upper network furnished with the above-mentioned mold. As the paper of the 2nd layer (the outermost layer) 2 tub formed on the paper of the 1st layer formed by eye one tub lapped, two-layer \*\*\*\*\* was manufactured by part for 50m/in paper-making rate using said pulp. Under the present circumstances, it inserted in the location which corresponds in the center of a mold using the approach by which these people proposed the thread manufactured above between the 1st layer (it converts into dry weight and they are 60 g/m<sup>2</sup>), and the 2nd layer (these 40 g/m<sup>2</sup>) by JP,5-40080,B so that a film plane side might be exposed to the aperture aperture section. Subsequently, according to the conventional method, it dried with the cylinder dryer after dehydrating a wet paper web, and the forged prevention form of this invention which consists of two-layer \*\*\*\*\* was manufactured.

[0031] The die length of the aperture aperture section [ in / in the obtained forged prevention form / the flow direction of a form ] was continuously formed so that 5mm spacing and 15mm spacing might repeat [ the die length of 10mm and the tunnel section ] at the flow direction of a form.

[0032] Forged prevention printed matter can be obtained by performing predetermined printing to the front face of the forged prevention form obtained by this invention. The example of the check which is the example is shown in drawing 10 . Predetermined printing is performed to the front face of this check, and as illustrated, the die length of the thread T exposed to the aperture aperture section W and the tunnel section 1 differs, respectively.

[0033] Next, the detection approach of the forged prevention means of a forged prevention form or forged prevention printed matter acquired by this invention is described. Drawing 11 is a conceptual diagram for explaining an example of the detection approach. it consists of the floodlighting section and a light sensing portion -- reading -- the forged prevention form under [ the section 2 to ] migration (the time of manufacturing two-layer \*\*\*\* doubling paper in this example -- between layers -- Thread T -- \*\*\*\*\* rareness --) a thread is exposed to the aperture aperture section W prepared in the 1st layer -- \*\*\*\* -- scattered reflection of the laser beam \*\* irradiated by the front face of forged prevention printed matter is carried out in the tunnel section 1 of Thread T and a form exposed to the aperture aperture section W prepared on the surface of the form, and it detects the strength of the scattered reflection light \*\* by the light sensing portion. For example, in the example of drawing 2 - drawing 4 , a signal which was illustrated in each drawing is detectable with a detector. A form is specified by comparing with the signal pattern which computer processing of the detected signal is carried out, and has been memorized beforehand automatically.

[0034]

[Effect of the Invention] According to this invention which was mentioned above, remarkable effectiveness which is described below is acquired.

1) The die length of the aperture aperture section by which the paper containing an aperture aperture thread known conventionally was intermittently prepared in the form front face, and the tunnel section was made into regular intervals, respectively. This invention changes such die length positively, he is conscious of it as a new means of forged prevention of this, and the forged prevention form equipped with the new forged prevention means which is not in the former is obtained.

2) By detecting automatically the die length of a thread and the die length of the tunnel section which are exposed to the aperture aperture section with an optical means, the new forged prevention means adopted as this forged prevention form can be detected automatically.

3) The forged prevention form obtained by this invention taking advantage of the above properties can be used suitable for the application of which forged prevention ability, such as a bill, a note, a check, a stock certificate, a debenture, a gift certificate, an admission ticket, a card, secret papers, a passport, and an identification card, is required.

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[Translation done.]

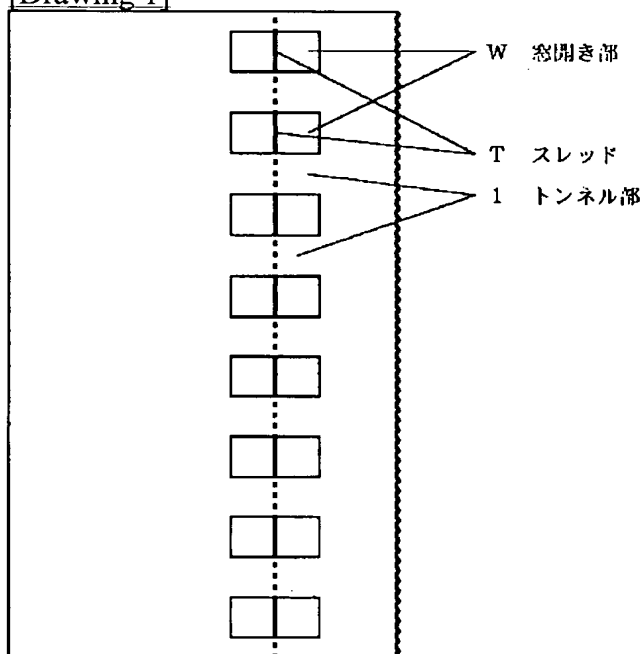
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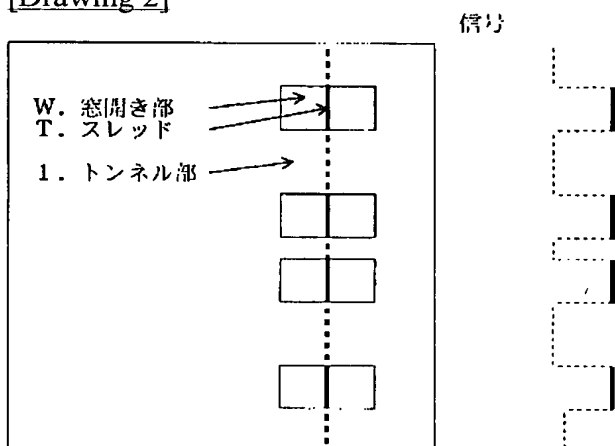
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## DRAWINGS

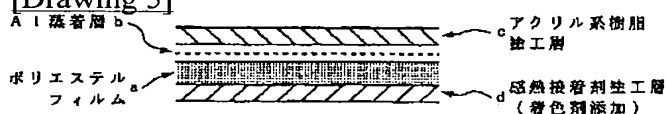
[Drawing 1]



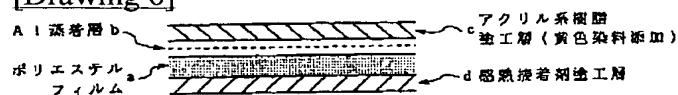
[Drawing 2]



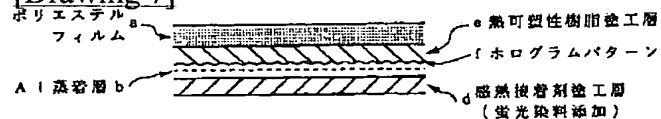
[Drawing 5]



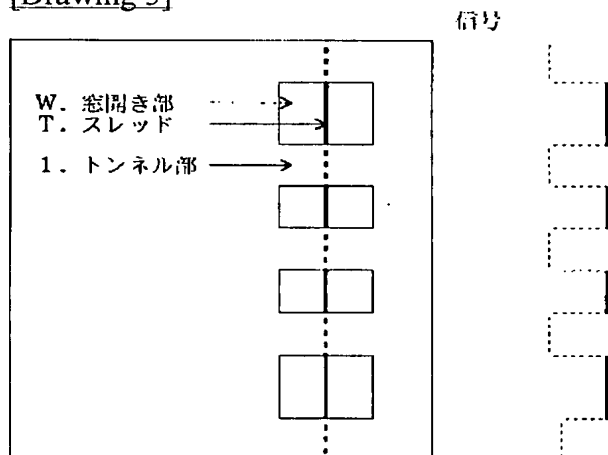
[Drawing 6]



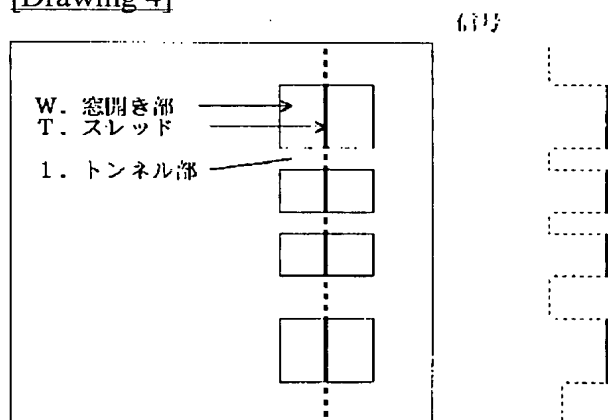
[Drawing 7]



[Drawing 3]



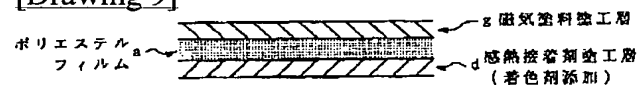
[Drawing 4]



[Drawing 8]



[Drawing 9]



[Drawing 10]

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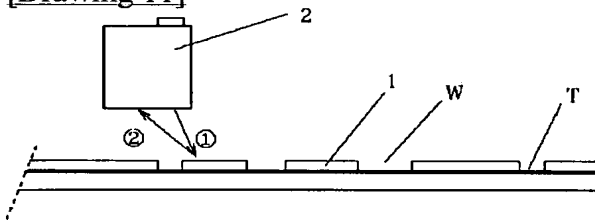
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[Drawing 11]



[Translation done.]

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紙株式会社内

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JB21 JB24 JB28 KA37

2H113 AA06 BB02 BB22 BB33 CA39

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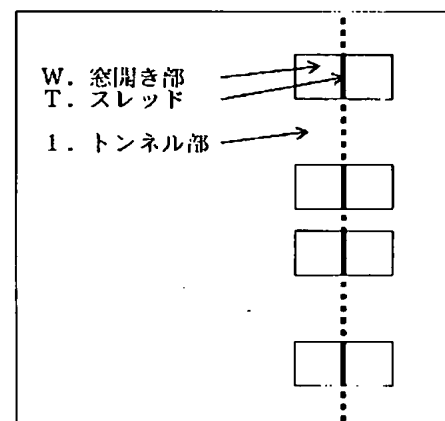
(54)【発明の名称】 偽造防止用紙及び偽造防止印刷物及び偽造防止手段の検出方法

(57)【要約】

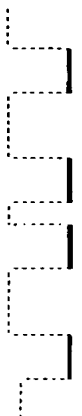
【課題】 用紙の表面に間欠的に設けられた窓開き部にスレッドを露出した「窓開きスレッド入り紙」で、偽造防止手段を自動的に検出する手段を得る。

【解決手段】 用紙の表面の流れ方向に、窓開き部

(W)及びトンネル部(1)が連続的に形成された偽造防止用紙において、用紙の流れ方向に対する該窓開き部の長さ及び／またはトンネル部の長さが異なり、かつ該窓開き部に、トンネル部の光学的特性とは異なる光学的特性を有するスレッド(T)が露出していることを特徴とする偽造防止用紙。この偽造防止用紙の表面に所定の印刷を施し偽造防止印刷物を得る。また、この偽造防止用紙若しくは偽造防止印刷物の窓開き部に露出したスレッドの長さ及びトンネル部の長さを光学的方法で自動検出することで用紙を特定する。



信号



**【特許請求の範囲】**

**【請求項1】** 用紙の表面の流れ方向に、窓開き部

(W) 及びトンネル部(1) が連続的に形成された偽造防止用紙において、用紙の流れ方向に対する該窓開き部の長さ及び／またはトンネル部の長さが異なり、かつ該窓開き部に、トンネル部の光学的特性とは異なる光学的特性を有するスレッド(T) が露出していることを特徴とする偽造防止用紙。

**【請求項2】** 前記偽造防止用紙の表面に所定の印刷を施したことを特徴とする偽造防止印刷物。

**【請求項3】** 前記偽造防止用紙若しくは偽造防止印刷物の窓開き部に露出したスレッドの長さ及びトンネル部の長さを光学的方法で自動検出することで用紙を特定することを特徴とする偽造防止手段の検出方法。

**【発明の詳細な説明】****【0001】**

**【発明の属する技術分野】** 本発明は、偽造防止用紙及び偽造防止印刷物及び偽造防止手段の検出方法に関するものである。さらに詳しくは、用紙表面の流れ方向に間欠的に設けられた窓開き部にスレッドを露出させた偽造防止用紙において、窓開き部とトンネル部の長さを変化させた偽造防止用紙、及びこの偽造防止用紙に所定の印刷を施した偽造防止印刷物、及びこの偽造防止用紙若しくは偽造防止印刷物の表面の窓開き部に露出したスレッドとトンネル部の長さを光学的方法で自動検出することでこの偽造防止用紙若しくは偽造防止印刷物に採用されている偽造防止手段を検出する方法に関する。

**【0002】**

**【従来の技術】** 紙幣、商品券等は、不正に変造、偽造できないように、各種の偽造防止対策が施されている。偽造防止対策の考えの一つは、容易に製造できないように高度な製造技術を用いて用紙を製造することである。その一例として、「窓開きスレッド入り紙」と呼ばれる偽造防止用紙があり、各国の紙幣や商品券等で多く使用されている。その一例を図1で示す。図1は用紙の流れ方向に窓開き部Wとトンネル部1が間欠的に設けられ、これら窓開き部にスレッドTが露出している従来公知の窓開きスレッド入り紙の一例を示す概念図である。

**【0003】** 前記窓開きスレッド入り紙の製造方法は種々提案されている。例えば、特公平05-085680号には、長網抄紙機のワイヤー上の紙料懸濁液に、凹凸を有するガイドの凸部先端にスレッドを通した溝を有するベルト機構を埋没し、窓開きスレッド入り紙を製造する方法が提案されている。

**【0004】** また特開平06-272200号には、長網抄紙機ワイヤー上の回転ドラム内に圧縮空気ノズルを内蔵させ、予め湿紙に挿入したスレッド上のスラリーを圧縮空気の間欠的に吹き飛ばしてスレッドを露出させる方法が提案されている。

**【0005】** また米国特許第4462866号には、凹

凸状に加工した網を円網抄紙機の上網に使用し、スレッドを網表面の凹凸部に接触させながら挿入して窓開き部分にスレッドを露出させる方法が提案されている。

**【0006】** また、本出願人は、特願平8-135244号において、多槽式円網抄紙機を使用して、窓開き部を形成した最外層の紙層と形成しないプレーンな紙層とを抄き合わせる際に、窓開き部分にスレッドを供給する方法を提案した。

**【0007】**

10 **【発明が解決しようとする課題】** これら従来の「窓開きスレッド入り紙」は、いずれも用紙表面に等間隔に間欠的に露出したスレッドを目視により観察することで用紙の真贋を判定していた。仮に観察が不十分で偽造された商品券や小切手で使用されてしまった場合でも、最終的に金額などを集計する集計機等で偽造防止手段を検出できるとこの時点で偽造の発見が自動的に行えることとなり、偽造防止効果がより高まることとなる。本発明はこのような観点でなされたもので、新規な偽造防止用紙、及び偽造防止印刷物、及び偽造防止手段の検出方法を得ることを課題とする。

**【0008】**

**【課題を解決するための手段】** 本発明は、用紙の表面の流れ方向に、窓開き部W及びトンネル部1が連続的に形成された偽造防止用紙において、用紙の流れ方向に対する該窓開き部の長さ及び／またはトンネル部の長さが異なり、かつ該窓開き部に、トンネル部の光学的特性とは異なる光学的特性を有するスレッドTが露出していることを特徴とする偽造防止用紙である。

20 **【0009】** また本発明は、前記偽造防止用紙の表面に所定の印刷を施したことを特徴とする偽造防止印刷物である。

**【0010】** また本発明は、前記偽造防止用紙若しくは偽造防止印刷物の窓開き部に露出したスレッドの長さ及びトンネル部の長さを光学的方法で自動検出することで用紙を特定することを特徴とする偽造防止手段の検出方法である。

**【0011】**

**【発明の実施の形態】** 以下本発明を詳細に説明する。図2は、本発明の偽造防止用紙の一例を示す概念図であり、用紙の表面の流れ方向に、窓開き部W及びトンネル部1が連続的に形成されている。この例では、用紙の流れ方向に対する窓開き部の長さはいずれも同じで、トンネル部の長さが異なり、かつ該窓開き部に、トンネル部の光学的特性とは異なる光学的特性を有するスレッドTが露出している。

**【0012】** 図3は、本発明の偽造防止用紙の別の一例を示す概念図であり、用紙の表面の流れ方向に、窓開き部W及びトンネル部1が連続的に形成されている。この例では、用紙の流れ方向に対する窓開き部の長さが異なり、トンネル部の長さが同じで、かつ該窓開き部に、ト

ンネル部の光学的特性とは異なる光学的特性を有するスレッドTが露出している。

【0013】図4は、本発明の偽造防止用紙の別の一例を示す概念図であり、用紙の表面の流れ方向に、窓開き部W及びトンネル部1が連続的に形成されている。この例では、用紙の流れ方向に対する窓開き部の長さトンネル部の長さが異なり、かつ該窓開き部に、トンネル部の光学的特性とは異なる光学的特性を有するスレッドTが露出している。

【0014】本発明の偽造防止用紙を製造するには、先ず、広葉樹晒クラフトパルプ(LBKP)、針葉樹晒クラフトパルプ(NBKP)、広葉樹晒サルファイトパルプ(LBSP)、針葉樹晒サルファイトパルプ(NBSP)等の化学パルプや、碎木パルプ(GP)、サーモメカニカルパルプ(TMP)等の機械パルプといった木材パルプや、さらには、コットンパルプ、麻、バガス、ケナフ、エスパルト、楮、三桠、雁皮等の非木材パルプを単独、或いは2種類以上を併用し、これに乾燥紙力増強剤、湿潤紙力増強剤、サイズ剤、定着剤、歩留り向上剤、濾水性向上剤、消泡剤、染料、着色顔料などを適宜併用し、通常フリーネス250~550ml C. S. F.の紙料を調製する。

【0015】本発明においては、用紙のトンネル部の光学的特性とは異なる光学的特性を有するスレッドを使用することが必要である。これを実現させるには、例えば、スレッドの光反射率をトンネル部分と異ならせるとよい。

【0016】以下、具体的な例を何点か図面をもとに説明する。

#### 銀色のスレッドの製造例 (図5参照)

厚み12 $\mu$ mのポリエステルフィルムaの一方の面に金属アルミニウムを400~500オングストローム真空蒸着してアルミニウム蒸着層bを形成した後、さらにこの上に2液硬化型のアクリル系樹脂を2 $\mu$ m程度グラビアコーターを使用して塗工し、アクリル系樹脂塗工層cを形成する。ポリエステルフィルムaの他方の面には感熱接着剤を5 $\mu$ m程度塗工して感熱接着剤塗工層dを形成する。次いでマイクロスリッターを使用して細い巾に連続的にスリットしてスレッドを製造し、ボビンに巻き取る。この構成のスレッドは、用紙に抄き込む場合にアクリル系樹脂塗工面側が窓開き部に露出するようにして用紙に抄き込む。感熱接着剤塗工層dはスレッド裏面となり、用紙の乾燥時に溶融して用紙を構成するセルロース繊維と強固に接着する。スレッド表面側から見るとアクリル系樹脂塗工層cを通してアルミニウム蒸着層bが銀色に見え、この部分は用紙のトンネル部と比較して光の反射率が著しく大きくなっている。

#### 【0017】金色のスレッドの製造例 (図6参照)

上記した図5において、2液硬化型のアクリル系樹脂塗工層cに黄色の染料を添加する。この構成では、スレ

ド表面側から見ると黄色に着色されたアクリル系樹脂塗工層cを通してアルミニウム蒸着層bが金色に見え、この部分はやはり用紙のトンネル部と比較して光の反射率が著しく大きくなっている。なお、アクリル系樹脂塗工層cに青色あるいは赤色染料を添加すると、アクリル系樹脂塗工層cを通してアルミニウム蒸着層bがそれぞれ青銀色あるいは赤銀色に見えるようになる。

#### 【0018】ホログラムスレッドの製造例 (図7参照)

厚み12 $\mu$ mのポリエステルフィルムaの一方の面に透明な熱可塑性樹脂を2 $\mu$ m程度塗工して熱可塑性樹脂塗工層eを形成した後、この上にホログラムパターンfを熱エンボスする。次いで、このホログラムパターンfの上にさらに金属アルミニウムを400~500オングストローム蒸着してアルミニウム蒸着層bを形成し、アルミニウム蒸着層bの上に感熱接着剤を塗工して感熱接着剤塗工層dを形成する。この構成では、ポリエステルフィルムa面側が窓開き部に露出し、ポリエステルフィルムaを通してホログラムパターンfが視認でき、この部分は用紙のトンネル部と比較して光の反射率が著しく大きくなっている。この構造において、熱可塑性樹脂塗工層eに黄色、青色あるいは赤色染料を添加した場合には、スレッド表面側から見るとポリエステルフィルムaを通してそれぞれ金色、青銀色あるいは赤銀色のホログラムパターンfを見ることができる。

#### 【0019】微小文字入りスレッドの製造例 (図8参照)

厚み12 $\mu$ mのポリエステルフィルムaの一方の面に黒インキを使用して微小文字を裏文字として印刷hした後、この印刷hの上に金属アルミニウムを真空蒸着してアルミニウム蒸着層bを形成する。次いでアルミニウム蒸着層bの上にさらに感熱接着剤を塗工して感熱接着剤塗工層dを形成する。この構成のスレッドは、ポリエステルフィルムa面側を窓開き部に露出させる。スレッド表面側からルーペ等で拡大して観察すると、ポリエステルフィルムaを通してアルミニウム蒸着層bの銀色の背景の中に黒色の正文字の微小文字の印刷hが見える。なお微小文字は印刷加工によらずに、抜き加工(いわゆるパスター加工)で施してもよい。この構成のスレッドを抄き込んだ偽造防止用紙は窓開き部に露出するスレッドの部分が用紙のトンネル部と比較して光の反射率が著しく大きくなっている。

#### 【0020】磁気スレッドの製造例 (図9参照)

厚み12 $\mu$ mのポリエステルフィルムaの一方の面に2液硬化型のポリエステル樹脂と酸化鉄粉末を主成分とする磁気塗料を10 $\mu$ m程度グラビアコーターを使用して塗工し、磁気塗料塗工層gを形成する。ポリエステルフィルムaの他方の面には感熱接着剤を5 $\mu$ m程度塗工して感熱接着剤塗工層dを形成する。この構成のスレッドは、スレッド表面側から見ると磁気塗料塗工層gが酸化鉄粉末の色(褐色や黒色)に見え、この部分は用紙のト



ンネル部と比較して今までとは反対に光の反射率が小さくなっている。

【0021】本発明の偽造防止用紙を前記した特公平05-085680号の方法で製造する場合には、長網抄紙機のワイヤー上に前記スラリーを供給して、凹凸を有するガイドの凹凸部の長さを変化させ、凸部先端にスレッドを通した溝を有するベルト機構を埋没し用紙の窓開き部にスレッドを露出させればよい。

【0022】また前記した特開平06-272200号の方法で製造する場合は、長網抄紙機ワイヤー上の回転ドラム内に圧縮空気ノズルを内蔵させ、予め湿紙に挿入したスレッド上のスラリーを圧縮空気の間欠的に吹き飛ばす際に、吹き飛ばす時間を変化させることで用紙の窓開き部にスレッドを露出させればよい。

【0023】また米国特許第4462866号の方法で製造する場合には、凹凸状に加工した長さを変化させた網を円網抄紙機の上網に使用し、スレッドを網表面の凹凸部に接触させながら挿入して窓開き部分にスレッドを露出させればよい。

【0024】また、本出願人が先に提案した特願平8-135244号の方法で製造する場合には、多槽式円網抄紙機を使用して、最外層の紙層に長さを変化させた窓開き部分にスレッド露出させればよい。

【0025】この際、本出願人が特願平8-135244号で提案したように、窓開き部に文字や画像からなるすき入れを配することも適宜行うことができる。

【0026】本発明では、窓開きスレッド入り紙を製造する場合に前記した方法に限らず、従来窓開きスレッド入り紙の製造で提案されたあらゆる方法を採用できることは言うまでもない。

【0027】

【実施例】以下本発明の偽造防止用紙の実際の製造例を実施例で説明する。

#### 実施例1

##### スレッドの製造

厚み12 $\mu$ mのポリエステルフィルムの一方の面に金属アルミニウムを400オングストローム蒸着してアルミニウム蒸着層を形成した後、さらにこの上にポリエステル系感熱接着剤（商品名「バイロン」、東洋紡（株）製造）を5g/m<sup>2</sup>（乾燥換算）塗工して感熱接着剤塗工層を形成した。次いでマイクロスリッターを使用して巾1.5mmにスリットしスレッドを製造した。

##### 【0028】紙料の調製

NBKP20重量部、LBKP80重量部をフリーネス350m1C. S. F. に叩解し、これに白土10重量部、紙力増強剤（商品名「ポリストロン191」、荒川化学工業（株）製）0.3重量部、サイズ剤（商品名「サイズバインE」、荒川化学工業（株）製）1.0重量部、硫酸バンドを適量加え紙料を調製した。

##### 【0029】抄紙網の製造

2槽式円網抄紙機の円網シリンダーの上網（幅1300mm）に、短辺10mm、長辺15mm、厚み0.3mmの樹脂板からなる多数の型を接着剤を使用して紙層の流れ方向に5mm間隔と15mm間隔が繰り返すように連続的に貼りつけた。この列を上網の幅方向に等間隔に6列取り付けた。

##### 【0030】用紙の抄造

2槽式円網抄紙機の1槽目の円網シリンダーには何等細工を施さない上網を装着し、2槽目の円網シリンダーには上記型を取り付けた上網を装着した。1槽目で形成した第1層目の紙層の上に2槽目形成した第2層目（最外層）の紙層が重なるようにして、前記紙料を用い抄紙速度50m/分で2層抄合わせ紙を製造した。この際、第1層目（乾燥重量に換算して60g/m<sup>2</sup>）と第2層目（同40g/m<sup>2</sup>）の間に上記で製造したスレッドを本出願人が特公平5-40080号で提案した方法を用いて型の中央に相当する位置に、フィルム面側が窓開き部に露出するように挿入した。次いで常法に従い湿紙を脱水後、シリンダードライヤーで乾燥し、2層抄合わせ紙からなる本発明の偽造防止用紙を製造した。

【0031】得られた偽造防止用紙は、用紙の流れ方向における窓開き部の長さが用紙の流れ方向に10mm、トンネル部の長さが5mm間隔と15mm間隔が繰り返すように連続的に形成されていた。

【0032】本発明で得られる偽造防止用紙の表面に所定の印刷を施すことで偽造防止印刷物を得ることができる。図10にその一例である小切手の例を示す。この小切手の表面には所定の印刷が施されており、図示したように、窓開き部Wに露出するスレッドTとトンネル部1の長さがそれぞれ異なっている。

【0033】次に本発明で得られる偽造防止用紙や偽造防止印刷物の偽造防止手段の検出方法について述べる。図11はその検出方法の一例を説明するための概念図である。投光部と受光部よりなる読み取り部2から、移送中の偽造防止用紙（この例では2層抄き合わせ紙を製造する際に層間にスレッドTが巻き込まれ、1層目に設けられた窓開き部Wにスレッドが露出している）や偽造防止印刷物の表面に照射されたレーザ光①が、用紙の表面に設けられた窓開き部Wに露出するスレッドTと用紙のトンネル部1で乱反射され、その乱反射光②の強弱を受光部で検出する。例えば図2～図4の例では、それぞれの図で図示したような信号を検出器で検出することができる。検出した信号はコンピュータ処理されて自動的に予め記憶してある信号パターンと比較することで用紙を特定する。

##### 【0034】

【発明の効果】上述したような本発明によれば、下記に述べるような顕著な効果が得られる。

1) 従来知られていた窓開きスレッド入り紙は、用紙表面に間欠的に設けられた窓開き部とトンネル部の長さは

それぞれ等間隔としていた。本発明はこれらの長さを積極的に変化させ、これを偽造防止の新たな手段として意識したものであり、従来に無い新規な偽造防止手段を備えた偽造防止用紙が得られる。

2) 窓開き部に露出するスレッドの長さトンネル部の長さを光学的な手段で自動検出することで、この偽造防止用紙に採用された新規な偽造防止手段を自動的に検出できることとなる。

3) 以上のような特性を生かして本発明で得られる偽造防止用紙は、紙幣、手形、小切手、株券、債券、商品券、入場券、カード、機密文書、パスポート、身分証明書等の偽造防止能を要求される用途に好適に使用できる。

#### 【図面の簡単な説明】

【図1】 従来公知の窓開きスレッド入り紙の一例を示す概念図である。

【図2】 本発明の偽造防止用紙の一例を示す概念図である。

【図3】 本発明の偽造防止用紙の別の一例を示す概念図である。

【図4】 本発明の偽造防止用紙の別の一例を示す概念\*

\* 図である。

【図5】 銀色のスレッドの積層構造の例を示す断面図である。

【図6】 金色のスレッドの積層構造の例を示す断面図である。

【図7】 ホログラムスレッドの積層構造の例を示す断面図である。

【図8】 微少文字文字入りスレッドの積層構造の例を示す断面図である。

10 【図9】 磁気スレッドの積層構造の例を示す断面図である。

【図10】 本発明で得られる偽造防止用紙の表面に所定の印刷を施した偽造防止印刷物の例を示す概念図である。

【図11】 本発明で得られる偽造防止用紙や偽造防止印刷物の偽造防止手段の検出方法の概念を説明するための説明図である。

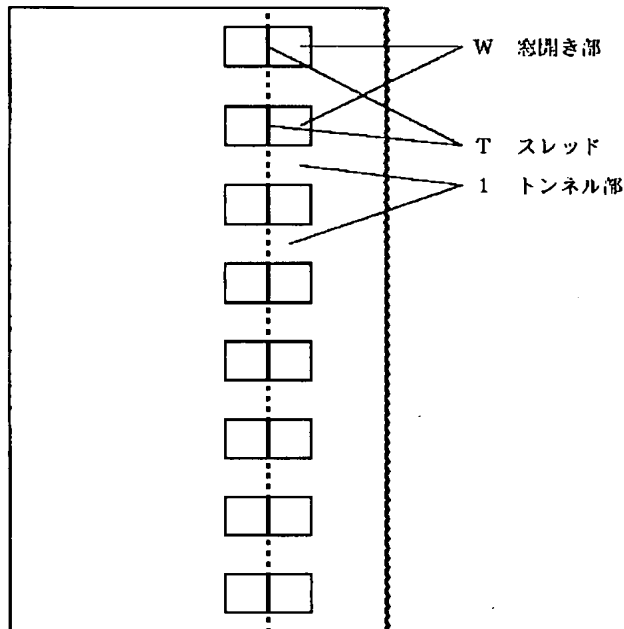
#### 【符号の説明】

1 トンネル部

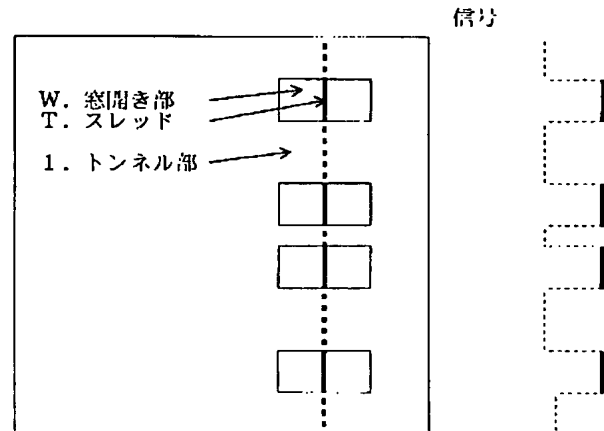
20 T スレッド

W 窓開き部

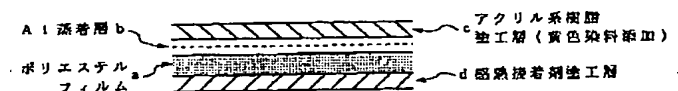
【図1】



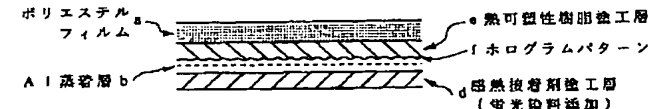
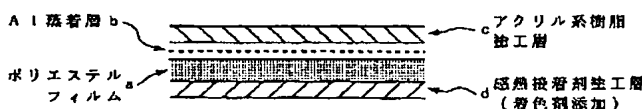
【図2】



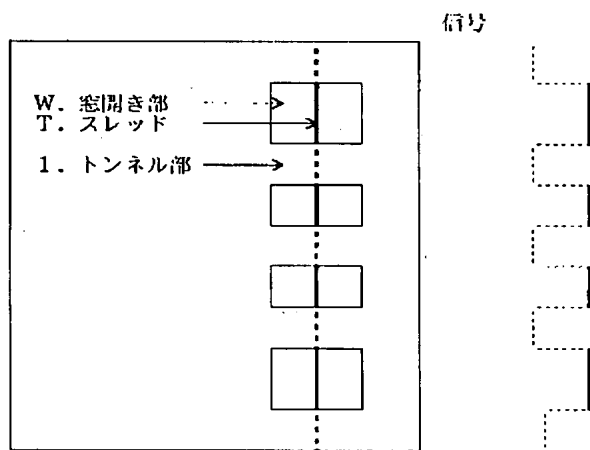
【図6】



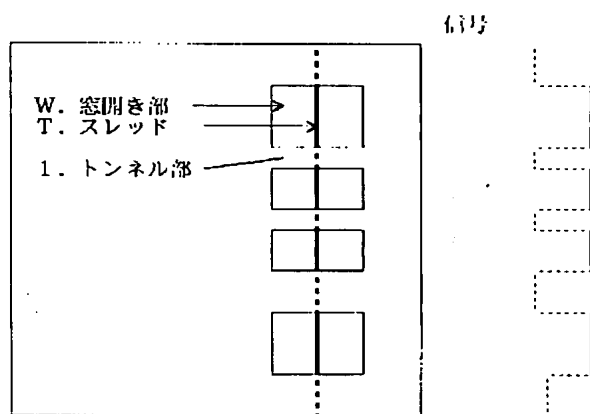
【図7】



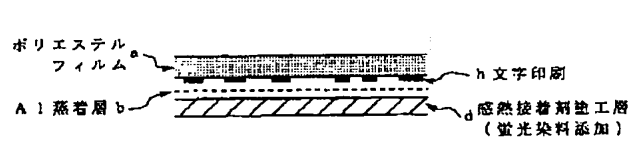
【図3】



【図4】



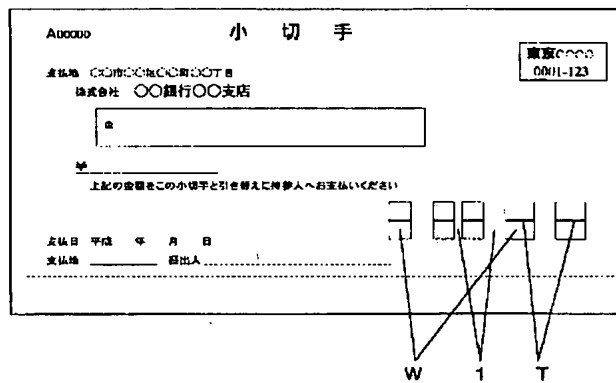
【図8】



【図9】



【図10】



【図11】

